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## A REVISION OF THE NORTH AMERICAN SPECIES OF POTAMOGETON OF THE SECTION COLEOPHYLLI.

HAROLD ST. JOHN.

THE genus *Potamogeton* has been the object of much study in Europe and in America, and consequently boasts an abundant literature. Within the last twenty-five years five authors have published monographic treatments<sup>1</sup> of it, all of which are useful to the students of the North American Potamogetons because of the wide dispersal of many of the species. *P. pectinatus*, for instance, one of the species considered in this article, is the most widespread of the genus and, as Bennett points out,<sup>2</sup> is found in all of the six zoölogical regions of the world defined by Wallace: the Palearctic, the Nearctic, the Neotropical, the Ethiopian, the Oriental, and the Australian.

In the introduction to his monograph Morong remarks, "so protean are their forms, so eccentric their action, constantly changing under changed conditions of season and water, that I put forth this treatise with great diffidence, and feel that the subject is very far from being exhausted." Very similar are my feelings concerning this fascinating, difficult genus, but in an attempt to solve some of the imperfectly understood complexes I have given a detailed study to *Potamogeton*

<sup>1</sup> Morong, Naiadaceae of N. Am., Mem. Torr. Bot. Club, iii. no. 2 (1893).

Fryer, Potamogetons of the British Isles (1898-1915).

Fischer, Die bayerischen Potamogetonen und Zanichellien, Ber. Bayer. Bot. Ges. xi. 20-162 (1907).

Ascherson und Graebner, Pflanzenreich, iv. Fam. 11 (1907).

Taylor, N. Amer. Flor. xvii. pt. 1, 14-27 (1909).

<sup>2</sup> Bennett in Fryer l. c., ix.

*pectinatus* L., *P. filiformis* Pers., and their allies, forming the section *Coleophylli*, and venture to make known my conclusions as to the North American species. The section *Coleophylli* Koch is characterized by the possession of submersed leaves only, which are adnate for some distance at the base with the stipule, forming a clasping sheath. The members of the group as now understood can be distinguished by means of the following key.

A simple notation is used to indicate the collections in which the specimens cited may be found.

- (A) Academy of Natural Sciences of Philadelphia.
- (C) Canadian Geological Survey.
- (H) Gray Herbarium.
- (N) New England Botanical Club.
- (R) Rocky Mountain Herbarium.
- (Y) Eaton Herbarium, Yale University.

- A. Leaves auricled at base, stiffly two-ranked, with a cartilaginous, finely and sharply serrate margin.....1. *P. Robbinsii* Oakes.
- A'. Leaves not auricled at base, not definitely two-ranked, not serrate.
- B. Style slender, incurved, persistent as a beak on the mature fruit.
- C. Leaves (except those of the first year's shoot which are coarser and blunt) 0.2-1 mm. broad, acute, taper-pointed; sheaths but slightly thicker than the stem.....2. *P. pectinatus* L.
- C'. Leaves 2-4 mm. broad, obtuse or shortly apiculate; the upper short, 1.5-2.5 cm. long; sheaths loose, 2-4 times thicker than the stem.
  - 3. *P. latifolius* (Robbins) Morong.
- B'. Style wanting, fruit beakless; leaves retuse, blunt, or often shortly apiculate.
- D. Whorls of flowers 5-12, evenly spaced, or the lower somewhat more remote: the upper leaves filiform; primary sheaths swollen, 2-5 times thicker than the stem, bearing short ribbon-like blades.
  - 4. *P. moniliformis* St. John.
- D'. Whorls of flowers 2-5, the upper approximate: sheaths tight, all bearing filiform blades.
- E. Mature spike elongate, moniliform, 1.5-5 cm. long; verticels mostly remote, the upper 3-12 mm. apart, the lower usually 0.7-2.5 cm. apart.....5. *P. filiformis* Pers.
- E'. Mature spike short, 0.5-2.5 cm. long; the upper verticels mostly approximate, the lower approximate or at most 7 mm. apart.
- F. Leaves fine, 0.25-0.5 mm. broad, retuse or obtuse.
  - 5a. *P. filiformis* Pers., var. *borealis* (Raf.) St. John.
- F'. Leaves coarse, 0.75-2 mm. broad, obtuse or shortly apiculate.
  - 5b. *P. filiformis* Pers., var. *Macounii* Morong.

1. *P. ROBBINSII* Oakes, Hovey's Magaz. vii. 180 (1841).—Stem stout, often freely branching: leaves linear, auricled at base, borne in two ranks and stiffly divergent, 2–8 cm. long, 3–7 mm. wide, those of the inflorescence reduced almost to narrow bracts; the margins cartilaginous, finely and sharply serrate; midrib broad, flanked by many fine secondary nerves; stipules white, many-nerved, soon becoming deeply lacerate: flowering shoots with elongate internodes and much reduced leaves, branching to produce several peduncles 1.5–5 cm. long: spikes short, 7–18 mm. long, loosely flowered, rarely maturing fruit: fruit obliquely obovate, with a sharp central keel and rounded lateral keels, 4 mm. long, 3 mm. wide; sides with a shallow depression; beak subapical, 1 mm. long.—Generally distributed in quiet waters from New Brunswick south to Delaware and west to British Columbia and Oregon.

MAINE: pools in the Mattawamkeag River, below Island Falls, Aroostook County, Sept. 25, 1901, *M. L. Fernald* (N); quiet pools in Piscataquis River, Dover, Aug. 27, 1894, *M. L. Fernald* (N); in a muddy pond, Plymouth, 1860, *J. W. Chickering* (H); East Wilton, Valley of the Sandy River, 1894, *Kate Furbish* (N); Haley Pond, Rangely, 1894, *Kate Furbish* (N); Loon Lake, Rangely Lake Region, Aug., 1894, *Kate Furbish* (N); the most abundant plant in the inlet of Lambert Lake, Valley of the St. Croix River, Washington County, Sept. 1, 1908, *M. L. Fernald* (N); in 5–7 feet of water, Biscay Pond, Bristol, Sept. 6, 1898, *E. B. Chamberlain*, no. 822 (N); Torsey Pond, Readfield, Sept., 1892, *Kate Furbish* (N); Messalonskee River, Waterville, Sept. 2, 1898, *M. L. Fernald*, no. 2,725 (N); South Poland, Valley of the Androscoggin River, 1893, *Kate Furbish* (N); Androscoggin Lake, North Leeds, Sept., 1894, *Kate Furbish* (N); West Baldwin, Valley of the Saco River, Sept., 1900, *Kate Furbish* (N). NEW HAMPSHIRE: Forest Lake, Dalton, Aug. 31, 1908, *A. S. Pease*, no. 11,580 (N); Pondicherry Pond, Jefferson, July, 1849, *J. W. Robbins* (A). VERMONT: Lake Champlain, Ferrisburg, Aug. 12, 1880, *E. & C. E. Faxon* (H & N); Lake Dunmore, Aug. 31, 1896, *Ezra Brainerd* (H); Lake Bomoseen, Castleton, Oct. 1, 1898, *W. W. Eggleston* (H). MASSACHUSETTS: Kenoza Lake, Haverhill, Aug. 10, 1913, *J. R. Lunt* (N); ad Lacum Wenham, *Oakes* (H); Westford, Aug., 1903, *Miss E. F. Fletcher*, no. 2 (H); Hagget's Pond, Andover, Aug. 8, 1903, *A. S. Pease*, no. 2,458 (N); Flax Pond, Lynn, Aug. 22, 1880, *E. & C. E. Faxon* (H & N); Sluice Pond, Lynn, Aug., 1880, *H. A. Young* (N); wet shore of Concord River, Concord, Aug. 5, 1886, *E. S. Hoar* (N); Mystic Pond, Winchester, Aug. 13, 1865, *William Boott* (H); Fresh Pond, Cambridge, July 1865, *Asa Gray* (H), July 25, 1879 and July 27, 1880, *Thomas Morong* (N); Cambridge, *Nuttall* (A); Jamaica Pond, Jamaica Plain, July 13, July 17, July 31, Aug. 10, Aug. 18, Aug. 30, 1880, *E. & C. E. Faxon* (H & N); in a pond, Plymouth, Aug. 26, 1913, *S. N. F. Sanford* (N); Lake Quinsigamond, Worcester, July 29, 1864, *J. W. Robbins* (H); ex canali ad Uxbridge, 1849, *J. W. Robbins* (H);

Harmon Pond, New Marlboro, June 29, 1912, *R. Hoffmann* (N); quiet water, Lake Garfield, Monterey, July 12, 1912, *R. Hoffmann* (N). RHODE ISLAND: Smithfield, May, 1845, *G. Thurber* (H); pond in a quarry, Lime Rock, Lincoln, Oct. 19, 1913, *H. St. John*, no. 900 (N). CONNECTICUT: shallow water, Dog Pond, Goshen, Aug. 24, 1913, *C. H. Bissell & C. A. Weatherby* (N); in Pistapaug Pond, Durham, Sept. 9, 1913, *A. E. Blewitt*, no. 1,681 (N); Hamlin's Pond, Southington, July 29, 1901, *C. H. Bissell* (H); ex Park River, Hartford, mense Junio florentem, 1845, *J. W. Robbins* (H); Lake Saltonstall, New Haven, 1857, *D. C. Eaton* (H). NEW ENGLAND: *E. Tuckerman* (H). NEW JERSEY: Budd's Lake, Morris County, Aug. 6, 1869, *T. C. Porter* (H); Morris Pond, July 20, 1907, *C. S. Williamson* (A); Swartzwood Lake, Aug. 31, 1904, *C. S. Williamson* (A no. 511,111). PENNSYLVANIA: above the forks of Neshaminy Creek, Bucks County, *Dr. Martindale* (A); in Lehigh River, Bethlehem, *Schweinitz* (A); Susquehanna River, Harrisburg, Aug. 26, 1863, *T. C. Porter* (A & H); Susquehanna below Columbia, Lancaster County, Aug. 31, 1863, *T. C. Porter* (H). DELAWARE: canal, Delaware City, Sept. 7, 1896, *A. Commons*, no. 18 (A & H). ONTARIO: Ottawa River near Britannia, Aug. 21, 1911 (C. no. 85,540); Plevna, July 29, 1902, *J. Fowler* (H); Cockburn Island, Lake Huron, *T. Bell* (H). INDIANA: Wolf Lake, Sept. 3, 1900, *Agnes Chase*, no. 1,463 (A). WYOMING: Heart Lake, Yellowstone Park, Hayden Expedition, 1878, *C. Richardson* (H). IDAHO: south end of Lake Coeur d'Alene, July 17, 1898, *L. F. Henderson*, no. 4,613 (H). OREGON: Strawberry Lake, 2,330 m. altitude, Blue Mountains, Sept. 8, 1910, *Wm. C. Cusick*, no. 3,622 (H); without definite locality, 1871, *Elihu Hall*, no. 495 (H). WASHINGTON: abundant in shallow water, Lake Cushman, Mason County, Aug., 1895, *C. V. Piper*, no. 2,231 (H); under two feet of water, Lake Cushman, July 6, 1890, *L. F. Henderson*, no. 1,861 (H). BRITISH COLUMBIA: Sumas River, Vancouver Island, Aug. 13, 1887, *John Macoun* (C no. 4,154); Dick's Lake, Sooke, Vancouver Island, Aug. 2, 1893, *John Macoun* (C no. 4,369).

2. *P. PECTINATUS* L., Sp. Pl. 127 (1753).<sup>1</sup> *P. interruptus* Kit. in Schult. Österr. Fl. ed. 2, i. 328 (1814). *P. flabellatus* Bab., Man. Brit. Bot. ed. 3, 343 (1851). *P. columbianus* Suksdorf, Deutsche Bot. Monatschr. xix. 92 (1901).—Rootstock creeping, freely branched, about 1 mm. thick, bearing terminal thickened bulblets: stem filiform, about 1 mm. thick, sparsely branched near the base, but towards the summit closely and abundantly forking: leaves 3–15 cm. long, bristle-like, mostly 0.25–1 mm. broad (those of the first year's shoot often broader and blunt), tapering to an acute tip, with 1–3 nerves; sheaths 2–5 cm. long, only slightly thicker than the stem, the sides often bleached to a chalky-white color; the ligule less than half the length of

<sup>1</sup> No attempt has been made to include full synonymy, which can be found especially in Ascherson & Graebner, l. c. Only such names as have been open to question in America and which now seem satisfactorily disposed of are given as synonyms.

the sheath: peduncles single, of variable length, bearing 2-5 often widely and unequally spaced whorls of flowers: fruit obliquely obovate, greenish or yellowish, 2.5-4 mm. long, 2-3 mm. broad, with a slender incurved style persistent as a beak on the mature fruit.—Widely distributed in brackish, alkaline, or sometimes fresh waters from eastern Newfoundland to British Columbia and southward, also in temperate and tropical regions of the rest of the world.

NEWFOUNDLAND: shallow tidal pools in salt marsh, Norris Arm, Valley of Exploits River, Aug. 21, 1911, *M. L. Fernald & K. M. Wiegand*, no. 4,494 (H); brackish or saline pool, Carboniferous area, Stephenville Crossing, head of Bay St. George, Aug. 14, 1910, *M. L. Fernald & K. M. Wiegand*, no. 2,461 (H); brackish pond, Port au Port ("The Gravels"), Aug. 15, 1910, *M. L. Fernald, K. M. Wiegand & J. Kittredge Jr.*, no. 2,462 (H). QUEBEC: pool in a brackish marsh, River Etamamiou, Charnay, Saguenay County, Aug. 28, 1915, *Harold St. John* (C): brackish pool near the mouth of Matane River, Matane, Gaspé County, Aug. 6, 1904, *F. F. Forbes* (H & C); tidal flats of the St. John (or Douglstown) River, Gaspé County, Aug. 23, 1904, *J. F. Collins, M. L. Fernald & A. S. Pease* (H). MAGDALEN ISLANDS: shallow ponds among the sand hills between East Cape and East Point, Coffin Island, Aug. 17, 1912, *M. L. Fernald, B. Long & H. St. John*, no. 6,790 (H); Hospital Pond, Grindstone Island, July 18, 1912, *M. L. Fernald, E. B. Bartram, B. Long & H. St. John*, no. 6,791 (H); deadwater of stream flowing into pond southwest of Étang du Nord wharf, Grindstone Island, July 25, 1912, *M. L. Fernald, E. B. Bartram, B. Long & H. St. John*, no. 6,793 (H); shallow water near the margins of brackish ponds southwest of Étang du Nord village, Grindstone Island, Aug. 15, 1912, *M. L. Fernald, B. Long & H. St. John*, no. 6,794 (H). PRINCE EDWARD ISLAND: abundant in a broad band near margin of North Lake, Aug. 24, 1912, *M. L. Fernald, B. Long & H. St. John*, no. 6,788 (H); Black Pond, July 28, 1912, *M. L. Fernald, E. B. Bartram, B. Long & H. St. John*, no. 6,787 (H); Lower Sea Cow Pond, Aug. 6, 1912, *M. L. Fernald, B. Long & H. St. John*, no. 6,789 (H). NOVA SCOTIA: salt pond, Baddeck, Cape Breton, 1883, *Dr. Burgess* (Y); salt ponds, Baddeck, Cape Breton, July 18, 1883, *J. Macoun* (C no. 4,150); salt marshes, Grand Narrows, Cape Breton, July 27, 1898, *J. Macoun* (C no. 20,752); brackish ponds, Sable Island, Aug. 5, 1900, *J. Macoun* (C no. 22,072); edge of brackish pond, Sable Island, Aug. 27, 1913, *H. St. John*, no. 1,126 (H). NEW BRUNSWICK: brackish pools at mouth of Tête-à-Gouche River, Bathurst, July 24, 1902, *E. F. Williams & M. L. Fernald* (H); cove in St. John River, Ingleside, Westfield, Aug. 7, 1909, *M. L. Fernald*, no. 1,616 (H). MAINE: near margin of Beau Lac, Saint Francis River, Aroostook County, Aug. 14, 1902, *W. W. Eggleston & M. L. Fernald* (H); brackish pools, Winnegance Creek, Phippsburg, Sagadahoc County, Aug. 23, 1909, *M. L. Fernald*, no. 1,613 (N). NEW HAMPSHIRE: Connecticut River, Hanover, July,

1876, *H. G. Jesup* (H). VERMONT: Lake Champlain, Aug. 7, 1880, *E. & C. E. Faxon* (H); mouth of Lewis Creek, Lake Champlain, Aug. 17, 1880, *E. & C. E. Faxon* (H & N); in Missiquoi River, Sheldon, Sept. 11, 1909, *A. E. Blewitt*, no. 2,136 (N). MASSACHUSETTS: Sachacha Pond, Nantucket, July 13, 1886, *F. S. Collins* (N); brackish water at south end of pond near Long Pond or in Long Pond, Nantucket, *W. Oakes* (H); fruit piled on shore of Coskata Pond, Nantucket, July 14, 1887, *W. Deane & T. Morong* (H); Nantucket, *L. L. Dame* (N); Sesachacha Pond, Nantucket, July 14, 1888, *Dame, Jenks & Swan* (N & Y); Siasconset, Nantucket, July 13, 1886, *F. S. Collins* (Y); in aquis minus salsis, in insula Martha's Vineyard, Aug. 17, 1865, *J. W. Robbins* (A); Mill pond, Mill River, New Marlboro, July 24, 1912, *R. Hoffmann* (N); Nigger Pond, and Housatonic River, Stockbridge, Aug. 20, 1902, *R. Hoffmann* (N). RHODE ISLAND: ex aqua salsa lacuna ad maris littus prope Newport, 1849, *J. W. Robbins* (H); brackish ditches, Newport, July 20, 1881, *Frank Tweedy* (Y); Chagum Pond, Block Island, Aug. 22, 1913, *M. L. Fernald, F. W. Hunnewell 2nd. & B. Long*, no. 8,453 (H); washed ashore, sandy and gravelly shores of Chagum Pond, Block Island, Sept. 13, 1913, *M. L. Fernald, B. Long & G. S. Torrey*, no. 8,452 (A & N). CONNECTICUT: Housatonic River, Oxford, Aug. 7, 1886, *E. B. Harger* (H); landlocked ditches and pools on salt meadows, abundant, Stratford, Sept. 5, 1902, *E. H. Eames* (H); abundantly filling ditches on salt meadows, in brackish water, Stratford, July 24, 1903, *E. H. Eames* (N); Hartford, 1857, *D. C. Eaton* (Y). NEW YORK: Western part, *E. Tuckerman* (H & Y); Chemung River, Elmira, Aug. 21, 1900, *W. C. Barbour*, no. 877 (R); Lake Seneca, Aug. 14, 1884, *T. Morong* (H); Thousand Islands of the St. Lawrence, Aug. 9, 1879, *Lester F. Ward* (Y); vicinity of Fisher's Landing, Thousand Islands, July 1902, *T. R. Robinson & W. R. Maxon*, no. 58a (H); Penn Yan, *H. P. Sartwell* (H). NEW JERSEY: Long Beach, *Read* (A). PENNSYLVANIA: found loose along the shore between Conshocken and Norristown, Aug. 9, 1868, *E. Diffenbaugh* (A); River opposite Harrisburg, Aug. 14, 1888, *T. C. Porter* (A no. 515,350); Susquehanna River, Safe Harbor, Lancaster County, July 13, 1861, *T. C. Porter* (A). DELAWARE: brackish water, Rehobeth, July 30, 1893, *A. Commons* (A). MARYLAND: off mouth of Mill Creek, in 25 inches of water, July 31, 1902, *G. H. Shull*, no. 140 (H); Sinepuxent Bay, Ocean City, July 25, 1875, *A. Commons* (A no. 543,578). NORTH CAROLINA: in 4 feet of water, mouth of North Channel, Currituck Sound, May 22, 1903, *G. H. Shull*, no. 457 (H). FLORIDA: *Chapman* (H). ONTARIO: Albany, James Bay, July 25, 1904, *W. Spreadborough* (C no. 62,659); Kingston, 1897, *Annie Boyd* (H); Kingston, Aug. 2, 1882, *J. Fowler* (A); Lake Scugog, Aug. 1, 1893, *J. Macoun* (C no. 16,473); Lakes and streams near Belleville, July 15, 1874, *J. Macoun* (C no. 3,017); Ashbridge's Bay, Toronto, June 19, 1896, *Wm. Scott* (C no. 16,464); Maitland River, Gooderich, Aug. 19, 1901, *J. Macoun* (C nos. 26,827

and 26,828); Sarnia Bay, Lambton County, July 7, 1896, *C. K. Dodge* (C no. 16,468); Pic River, Lake Superior, *Loring* (H). OHIO: Dayton, July 1883, *A. F. Foerste* (Y); INDIANA: Lake Maxinkickee, July 21, 1899, *A. W. Everman* (R); Wolf Lake, Sept. 3, 1900, *Agnes Chase*, no. 1,460 (A & H). MICHIGAN: shallow water, Algonac, July 29, 1901, *J. H. Shuette* (H); in water, Stony Island, Huron County, July 13, 1908, *C. K. Dodge*, no. 5 (H); Isle Royale, Sept. 2, 1910, *W. S. Cooper*, no. 311 (H); millpond, Alma, Aug. 30, 1893, *Chas. A. Davis* (H); Pine Lake near Michigan Agricultural College, July, 1895, *C. F. Wheeler* (H). WISCONSIN: Milwaukee, *I. A. Lapham* (H); shallow water on sandy bottom of lake, and muddy bottom of lakes, and running water, and sandy bottom of deep water lakes, Madison, *T. J. Hale* (A & Y); Duck Creek, Green Bay, June and Aug., 1878, *J. H. Shuette* (H); Green Bay, Sept., 1882, *J. H. Shuette* (H). ILLINOIS: Cedar Lake, Lake Villa, Aug. 8, 1906, *H. A. Gleason & F. D. Shobe*, no. 185 (H). MINNESOTA: Aug., 1889, *J. M. Holzinger* (R); Grand Lake, Stearn County, July, 1896, *Jennie E. Campbell* (R); Swan Lake, Nicollet County, July, 1892, *C. A. Ballard* (R). IOWA: Armstrong, July 29, 1897, *R. I. Cratty* (H). NORTH DAKOTA: immersed in ponds, Leeds, July, 1899, *J. Lunell*, no. 36 (H); Wahalla, Aug. 18, 1902, *L. R. Waldron*, no. 1,643 (R); Lake Irvine, Maza, July 27, 1900, *J. Kildahl* (R). SOUTH DAKOTA: Lake Campbell, July 4, 1893, *T. A. Williams* (H & R); Sioux River, Brookings, July 4, 1894, *J. T. Thornber* (H); Bigstone, Aug. 24, 1892, *T. A. Williams* (H & R); Lake Hendricks, Aug. 8, 1894, *Griffiths & Schlosser*, no. 16 (R); Gettysburg, 1892, *Griffiths & Schlosser* (R). NEBRASKA: in East Cody's Lake, at the head of Dismal River, Aug. 9, 1893, *P. A. Rydberg*, no. 1,659 (H); in Dismal River, south of Thedford, Thomas County, June 27, 1893, *P. A. Rydberg*, no. 1,439 (H); Wood Lake, Aug. 13, 1898, *J. M. Bates* (H). TEXAS: Knickerbocker Ranch, Dove Creek, Tom Green County, May, 1880, *Frank Tweedy* (Y); *Wright* (H). SASKATCHEWAN: Cumberland House, 1825, *Drummond* (H); still and slow flowing water, Bullrush (Reed) Lake, July 25, 1879, *J. Macoun* (C no. 4,147); Bullrush Lake, July 26, 1880, *J. Macoun*, no. 170 (H); in a pool on the prairie, Frenchman's River, June 19, 1895, *J. Macoun* (C no. 16,466); in ponds and lakes, south of Battleford, Aug. 3, 1879, *J. Macoun* (C no. 3,018); in water, Moose Mountain Creek, July 8, 1884, *J. M. Macoun* (C no. 4,148); pools, Moose Jaw, June 20, 1894, *J. Macoun* (C no. 16,467); Ribstone Creek, Aug. 14, 1906, *J. Macoun & W. Herriot* (C no. 76,873); 23 miles east of Saskatoon, July 23, 1906, *J. Macoun & W. Herriot* (C no. 76,874). MONTANA: Great Falls, Sept. 8, 1885, and Sept. 6, 1885, *R. S. Williams*, nos. 284 and 286 (Y); Bitterroot Valley near Frenchtown, Aug. 4, 1880, *S. Watson*, no. 394 (H). WYOMING: Bath Lake, Sept. 8, 1896, *A. Nelson*, no. 2,781 (H & R); Laramie River, Aug. 10, 1895, *A. Nelson*, no. 1,668 (H); Laramie River, July 15, 1895, *E. Nelson*, nos. 3,387 and 3,387a (R); rolling plains

between Sheridan and Buffalo, altitude 3,500–5,000 feet, June 15–July 15, 1900, *Frank Tweedy*, no. 3,558 (R & Y); Soda Lakes, Sept. 24, 1898, *A. Nelson*, no. 5,352 (R); McGill's Ranch, Aug. 9, 1895, *A. Nelson*, no. 1,668 (R); Rockyford, July 6, 1896, *A. Nelson*, no. 2,219 (R). COLORADO: Saguache, Sept. *Wolf & Rothrock* (R); Lee's Lake, Sept. 24, 1896, *C. S. Crandall*, no. 2,527 (H); Hiram Prince Lake, July 10, 1908, *W. W. Robbins*, no. 5,744 (R). UTAH: 1875, *C. C. Parry*, no. 16.5 (H). NEVADA: Thousand Spring Valley, 6,000 feet altitude, Sept., 1868, *S. Watson*, no. 1,138 (H & Y); Truckee Pass, 4,000 feet altitude, July, 1867, *S. Watson*, no. 1,145 (H & Y); Humboldt Lake, 4,000 feet altitude, Aug., 1867, *S. Watson*, no. 1,139 (H & Y); Pyramid Lake, May, 1879, *Miss S. A. Plummer* (H). NEW MEXICO: Northern part, 1851–52, *C. Wright*, nos. 1,894 and 1,895 (H & Y). ARIZONA: Santa Cruz Creek near Tucson, May, 1881, *J. G. Lemmon*, no. 299 (H). CALIFORNIA: 1833, *Douglas* (H); *Dr. Coulter*, no. 719 (H); Soldier's Home, in reservoir, Los Angeles County, June 19, 1902, *LeRoy Abrams*, no. 2,575 (H); shallow borders of ponds, San Bernadino Mountains, Aug. 1882, *S. B. & W. F. Parish*, no. 1,429 (Y); Los Angeles, *Rev. J. C. Nevin*, no. 516 (H); Monterey, Oct. 1, 1894, *G. P. Snell* (R); ponds, San Francisco, 1868–9, *A. Kellogg & W. G. Harford*, no. 950 (Y); Berkeley, July 18, 1895, *J. W. Blankinship* (H); common in sloughs, Suisun, Solano County, June 6, 1903, *C. F. Baker*, no. 3,215 (H); Cuyamaca Lake, 4,600 feet altitude, San Diego County, June 26, 1903, *LeRoy Abrams*, no. 3,906 (A & H); Monterey, Oct. 1, 1904, *G. P. Snell* (A no. 522,547); Santa Barbara, 1879, *Mrs. Elwood Cooper* (H); banks of Russian River, north of Cloverdale, July 9, 1902, *A. A. Heller*, no. 5,825 (A & H & R). OREGON: near Prineville, 955 m. altitude, Aug. 28, 1894, *J. B. Leiberg*, no. 847 (H); 1871, *Elihu Hall*, no. 494 (H & Y); Cascade Mountains, 49° North Latitude, 1859, *Dr. Lyall* (H). WASHINGTON: shallow places in the Columbia River, Klickitat County, Sept. 15, and Oct., 1891, *Wm. Suksdorf*, no. 2,062 (H); Okanagan River, Oct. 10, 1880, *S. Watson*, no. 394 (A & H). BRITISH COLUMBIA: Kamloops, June 26, 1889, *J. Macoun* (H and C no. 4,151); in water, Alberni, Vancouver Island, Aug. 2, 1887, *J. Macoun* (C no. 4,145).

This species growing in so many parts of the world and varying so greatly, as do many species of the genus, has naturally received many names. The great majority of these are by common consent treated as synonyms of *P. pectinatus*, but there are some better marked states of the plant which are insistently maintained as distinct species. The English botanists, Fryer and Bennett and others, treat as *P. interruptus* Kit. (*P. flabellatus* Bab.) a plant with or without broad 3–5-nerved lower leaves and with three-keeled fruits. Morong included *P. interruptus* in his *Naiadaceae of North America* on the basis of sterile, broad-leaved plants, collected in Manistee, Michigan, by E. J.



Hill and by himself, and from one other station in the same state. His illustration was drawn from English specimens supplied him by Mr. Fryer. Following Morong, this species has been kept as a North American plant in Gray's *Manual*, in Britton and Brown's *Illustrated Flora*, and in Taylor's treatment in the *North American Flora*. The leaf characters of *P. interruptus* as stated by its defenders are admittedly inconstant.<sup>1</sup> The fruit character, which is the main claim of *P. interruptus* to specific rank, seems to be just as inconstant, at least in the American plants, as the foliage character proves to be in the European ones. In a single spike, such as that on the sheet collected by L. L. Dame at Nantucket, Massachusetts, now in the Herbarium of the New England Botanical Club, can be seen fruits which have prominent dorsal keels as does *P. interruptus*, and also fruits with evenly rounded backs as in *P. pectinatus* (*stricto sensu*).

A quotation from a letter written by Mr. Arthur Bennett to Prof. M. L. Fernald throws an interesting light on the status of *P. interruptus* Kit. (*P. flabellatus* Bab.) in North America. "Having occasion to look through all my *interruptus* specimens, I was surprised to find attached to the sheet of Manistee specimens sent me, a letter from Prof. Babington dated 9, 2, 1882 in which he says 'Certainly I do not think that the Revd. Morong's plant is *Pot. flabellatus*. The habit of the flowering part is totally different from any specimens of my plant that I have seen.'" Bennett continues, "I cannot now understand why he [Morong] doubted Babington's decided opinion that it was not his *flabellatus*." Whether or not the European specimens of *P. pectinatus* will allow a division into *P. pectinatus* in its limited sense and *P. interruptus* (which is very doubtful), it seems to be clear that Morong was not justified in including *P. interruptus* as an American species. Likewise the more recently collected specimens and published notes seen by the author have not convinced him that any American plants can properly be treated as *P. interruptus* Bab.

*P. columbianus* Suksdorf<sup>2</sup> is worthy of mention in this connection, since it is not included in the *Pflanzenreich* or the *Index Kewensis*. Neither the duplicate-type material nor the description show any distinctive characters to separate it from *P. pectinatus*.

W. R. Dudley discusses<sup>3</sup> two plants from Cayuga Lake, New York,

<sup>1</sup> Fryer, Journ. Bot. xxvii. 59 (1889).

<sup>2</sup> Suksdorf, Deutsche Bot. Monatschr. xix. 92 (1901).

<sup>3</sup> Dudley, Cayuga Flora 107 (1886).

which he treats in both cases as *P. pectinatus* L. var.—? Number 1007 is a slender “sometimes proliferous” form “whose peduncle is usually over  $\frac{1}{4}$  m. long.” Number 1008 is a gigantic form, with plume-like bushy tops, up to  $5\frac{1}{2}$  m. in length, frequently proliferous, not found in flower or fruit. These plants have been known for many years, the latter since 1874, and have received intensive study by local observers for a number of years.

Through the kindness of Miss Emmeline Moore the author has been able to examine specimens corresponding to each of these numbers. Number 1007 is a very much elongated, deep-water state of *P. pectinatus*, but not distinct enough to require any special designation. Number 1008 proves to be similarly elongated, sterile *P. moniliformis* St. John.

3. *P. LATIFOLIUS* (Robbins) Morong, Mem. Torr. Bot. Club, iii. no. 2, 52 (1893). *P. pectinatus* L., var. (?) *latifolius* Robbins, Bot. King's Exp. 338 (1871).—Stem 1–2 mm. thick, whitish, freely branching above: leaves linear, obtuse or shortly apiculate, 2–4 mm. wide, 3–5 nerved with strong cross-veins making a rectangular pattern; the upper short, 1.5–2.5 cm. long; sheaths swollen, 2–4 times thicker than the stem; ligule short, obtuse, hyaline: peduncles short, 2–10 cm. long: spikes interrupted, 1–3 cm. long: fruit obovate, 3 mm. long, 2 mm. wide; style borne near the ventral margin, incurved.—Deep waters, still or flowing, Oregon, south to California and Arizona. NEVADA: Humbolt Lake, 4,000 feet altitude, Aug., 1867, *W. W. Bailey*, no. 1,142 (H); Hot Springs, Desert, Aug. 1874, *J. G. Lemmon*, no. 1,264 (H). ARIZONA: Santa Cruz Creek, Tucson, 1881, *J. G. Lemmon*, no. 579 (H). CALIFORNIA: King's River, 1876, *J. G. Lemmon*, no. 1,521 (H); in waters warmed by hot spring above 14 mile station, Bridgeport and Sonora Road, Mono County, Aug. 23, 1898, *J. W. Congdon*, no. 9,915 (H). OREGON: Goose Lake, July 23, 1897, *B. W. Evermann* (H).

4. *P. moniliformis*, n. sp., rhizomate 2–3 mm. crasso; caule superne valde ramoso, ramis 2–4 ad nodum, vaginis principalibus inflatis, quam caules 2–5-plo crassioribus, 2.5–5 cm. longis, 2–5 mm. latis, laminis brevibus obtusis habenis similibus latis, 1–4.5 cm. longis, 1–2 mm. latis, venis transversis nervisque reticulum crassum formantibus, nervis vaginalium prominentibus ad apicem incurvatis ligulam integram brevissimam defugantibus; foliis superioribus filiformibus obtusis vel retusis, 5–11 cm. longis, 0.2–1 mm. latis cum ligulis longioribus; pedunculis brevibus, 3–8 cm. longis, spicis interruptis, 1–6 cm. longis, verticillis multis (5–12) aequidistantibus vel inferioribus remotis, fructibus oblique obovatis non manifeste carinatis, 3 mm. longis, 2 mm. latis, stigmatibus sessilibus ad margines ventrales proximis.

Rootstock coarse, 2–3 mm. thick: stem freely branching above; 2–4 branches at a node: principal sheaths swollen, 2–5 times thicker than the stem, 2.5–5 cm. long, 2–5 mm. broad, with prominent veins bending into the blade but not appearing in the entire very short (1 mm.) ligule; blade short, blunt, ribbon-like, 1–4.5 cm. long, 1–2 mm. broad, the veins and cross veins forming a coarse rectangular pattern; upper leaves filiform, blunt or more commonly retuse, 5–11 cm. long, 0.2–1 mm. broad; upper sheaths less swollen, bearing longer ligules: peduncles short, 3–8 mm. long: spikes 1–6 cm. long, interrupted, with numerous (5–12) whorls of flowers, which are equally spaced or the lower more remote: fruit obliquely obovate, not prominently keeled, 3 mm. long, 2 mm. wide; the sessile stigma borne near the ventral margin.—Deep waters from Labrador west to Saskatchewan and Alberta and south to New York, Wisconsin, and North Dakota.

LABRADOR: shallow sandy-bottomed pools, Blanc Sablon River, Aug. 2, 1910, *M. L. Fernald & K. M. Wiegand*, no. 2,463 (H). QUEBEC: above tide mark in Blanc Sablon River, Brest, Saguenay County, July 31, 1915, *Harold St. John* (C). ONTARIO: Moose Factory, James Bay, July 15, 1904, *W. Spreadborough*, (C no. 62,661); shallow water, Misinaibi River, Aug. 1880, *R. Bell*, (C no. 3,013) NEW YORK: in 8 feet of water, Lake Cayuga, July 16, 1916, *Emmeline Moore*. MANITOBA: Palliser's Brit. N. Am. Expl. Expedition, Lac Winnipeg, 26 Juin 1859, *E. Bourgeau* (H & Y). SASKATCHEWAN: between Cumberland House and Hudson Bay, Aug., *Drummond* (H, TYPE); and on the same sheet, Carleton House (H); Palliser's Brit. N. Am. Expl. Expedition, 1858, *E. Bourgeau* (H & Y); Long Lake, July 6, 1879, *Macoun*, (C no. 4,176 & Y); in Cypress Lake, Cypress Hills, June 29, 1895, *Macoun*, (C no. 16,470); in water, Buffalo Lake, Aug. 3, 1888, *J. M. Macoun*, (C no. 4,175). WISCONSIN: University Bay, Lake Mendota, Aug. 19, 1912, *R. H. Denniston* (H). NORTH DAKOTA: Turtle Mts., Aug. 20, 1891, *Wright*, no. 727 (R). ALBERTA: Vermilion Lake, Banff, Rocky Mts., Aug. 13, 1891, *Macoun*, (C no. 4,374 in part); Vermilion Lakes, 4,500 feet altitude, Banff, July 23, 1906, *S. Brown*, no. 695 (A); in a lake, Milk River Ridge, July 20, 1895, *Macoun*, (C no. 16,469).

In 1854 *P. vaginatus* Turcz.<sup>1</sup> was described from a subsaline lake near Selenginsk, south of Lake Baikal, Siberia. In the original diagnosis the following characters are mentioned: sheaths loose, flowers in interrupted whorls, fruit obliquely obovate, finely striate, and leaves linear-setaceous, acute. Kihlman,<sup>2</sup> in recording *P. vaginatus* Turcz. from Europe for the first time, gives a careful description of the type material and a critical discussion of the species. He

<sup>1</sup> Turcz., Bull. Soc. Natur. Moscou, xi. 102 (1838) (nomen solum), xxvii. 65 (1854); Flora Baicalensi-Dahurica ii. 162 (1856).

<sup>2</sup> Osw. Kihlman, Meddel. af Societas pro Fauna et Flora Fennica, xiv. 111–115 (1887).

mentions the tall freely-branching habit, the blunt or retuse leaves, the ample clasping finely striate olive-green sheaths, the very short (1 mm.) entire ligule, the long spike of 5-11 (usually 7-8) whorls, which are equally distant or the lower farther spaced. All of these points would fit the American *P. moniliformis* described above, and, in fact, in Kihlman's citation of stations, with the six in Finland and Sweden, is one in North America: Saskatchewan, Bourgeau, Palliser's Expedition 1858, which he had seen in the Herbarium at St. Petersburg. The two sheets of this collection seen by the writer are tall coarse, freely branching plants with six and seven whorls, but they are very immature and show no sign of fruit. The American material with fruit shows it to be but 3 mm. long and with the sessile stigma borne near the ventral margin. On the other hand *P. vaginatus* Turcz. has the "fruit 3.2-3.5 mm. long and the stigma flattened, almost median on the fruit."<sup>1</sup> Bennett<sup>2</sup> says of it "beak very short, central," and his plate 58 drawn from Swedish specimens shows clearly this condition. It is because of this fundamental difference in the form of the fruit, the asymmetric position of the stigma, that I have described the American *P. moniliformis* as a distinct species. In recording *P. vaginatus* from Great Britain Bennett<sup>3</sup> cites two American stations, Assiniboia, Macoun! Buffalo Lake; and Labrador, Waitz! in herb. Boissier. The Buffalo Lake material, as cited above is *P. moniliformis* and the Labrador material may well be the same.

5. *P. FILIFORMIS* Pers., Syn. pl. i. 152 (1805). *P. marinus*, var. (?) *occidentalis* Robbins, King's Rep. 339 (1871). *P. filiformis*, var. *occidentalis* (Robbins) Morong, Mem. Torr. Bot. Cl. iii. No. 2, 51 (1893); Bennett, Ann. Conserv. Jard. Genève ix, 102 (1905). *P. interior* Rydb., Fl. Colorado, 13 (1906); *P. marinus* L. acc. to some authors, not L. herb. Rootstock creeping: stem usually short and repeatedly branched near the base giving the plant a very bushy habit, but in deep water the branching reduced and the stem elongated up to 30 cm.: sheaths short, tightly clasping the stem, not becoming divergent, about as long as the scarious early deciduous ligule; blades filiform, blunt, 5-12 cm. long, 0.25-0.5 mm. wide: peduncle exceeded by or overtopping the leaves: mature inflorescence elongate, interrupted, 1.5-5 cm. long; verticels mostly remote, the upper usually 3-12 mm. apart, the lower usually 0.7-2.5 cm. apart: fruit obovate, 2 mm. long, 1.5 mm. wide; the stigma broad and sessile.—Shallow pools, chiefly in calcareous areas in the boreal parts of North America; also Eurasia, Africa and Australia.

<sup>1</sup> Kihlman, l. c.

<sup>2</sup> Bennett in Fryer, Potamogetons of the British Isles 88, Plate 58 (1915).

<sup>3</sup> Bennett, Bull. Herb. Boissier iii. 257 (1895), and Journ. Bot. XLV. 172 (1907).

KEEWATIN: Cape Henrietta Maria, Hudson Bay, Aug. 14, 1904, *W. Spreadborough*, (C no. 62,660); Churchill, Hudson Bay, Lat. 58° 50', Aug. 3, 1910, *J. M. Macoun*, (C no. 79,199 & H). QUEBEC: St. John (or Douglastown) River, Gaspé County, Aug. 23, 1904, *J. F. Collins*, *M. L. Fernald*, & *A. S. Pease* (C & H). VERMONT: shallow bay south of "Carry," North Hero, Aug. 2, 1899, *Ezra Brainard* (H). NEVADA: Ruby Lake, alt. 6,000 feet, Aug., 1868, *Sereno Watson*, no. 1,143 (H & Y). ALASKA: shallow pools, St. Paul Island, Bering Sea, July 15, 1897, *J. M. Macoun*, (C no. 28,158).

Several recent European workers have subdivided this species into varieties or forms.<sup>1</sup> A tall coarse plant with leaves over 1 mm. in breadth is treated as var. *alpinus* (Blytt) Asch. & Graeb. This variety seems to be quite distinct. The species has been further divided on the basis of the overtopping of the spikes by the leaves or the reverse and the elongation or dwarfing of the stem, making a series of four forms or varieties. The variation in these parts seems to be due mainly to the fluctuations in the water level and to be negligible from our standpoint. All of the European specimens of *P. filiformis* Pers. and its varieties are characterized by having an elongate spike formed of mostly remote whorls.

For many years this plant was treated as *P. marinus* L. This Linnean species is very difficult to interpret with any surety on the basis of its description in the *Species Plantarum* or the sources cited there. A. Bennett discussed the basis of *P. marinus* in 1890<sup>2</sup> and again in 1895<sup>3</sup> concluding that "Most European authors use the name *P. marinus* Linn. In the Linnean Herbarium the specimens named *marinus* are only *pectinatus*"; and, following Bennett, the name *P. filiformis* has been almost universally adopted for the plant under discussion. A most disconcerting discovery is that Bennett himself in his most recent work has reverted to the name *P. marinus*.<sup>4</sup> In reply to my request for an explanation of this change Mr. Bennett dwells on the pre-Linnaean sources cited in the *Species Plantarum*, especially Boccone, *Icones et Descrip. Pl. Siciliae*, 42, and t. 20, f. 5 (1674) He concludes that, "This drawing might well have been made for a species of *P. fasciculatus* of Wolfgang, which is only a small *filiformis*!" Mr. Bennett is quite correct in saying that Boccone's *Potamogeton pusillum fluitans* might be some phase of the plant we

<sup>1</sup> Hagström in Neuman, *Sveriges Flora*, 794 (1901); Ascherson & Graebner, l. c.; Fischer, l. c.

<sup>2</sup> Bennett, *Journ. Bot.* xxviii. 301 (1890).

<sup>3</sup> Bennett, *Bull. Herb. Boissier* iii. 257 (1895).

<sup>4</sup> Bennett in Fryer, l. c. 89 (1915).

recognize as *P. filiformis*, but for anything that appears in Boccone's figure or description it might equally well be some form of the polymorphic *P. pectinatus*. In just such cases as this we are authorized by the International Rules for Botanical Nomenclature to cast aside the name "when it becomes a permanent source of confusion."<sup>1</sup> *P. setaceum* Schum.<sup>2</sup> is plainly the plant in question. In fact, Mr. Bennett writes "I have seen a specimen named by him [Schumacher] in Dr. Buchenau's herbarium." The name *P. setaceum* Schum. cannot stand because it is antedated by a Linnean plant of the same name, one which is maintained. The next name given to this plant was *P. filiformis* Pers., based on Schumacher's plant, and this name seems perfectly valid. Bennett when using the name *P. filiformis* credits it to Nolte, but Nolte did not make this combination. He credits it to Persoon, "84. *Potamogeton filiformis* Persoon," and gives the Schumacher reference.

*P. filiformis* Pers., var. *occidentalis* (Robbins) Morong, Mem. Torr. Bot. Club iii. no. 2, 51 (1893) (*P. interior* Rydb.) from Ruby Lake, Nevada, is a coarse sparsely branched plant, 5-6 dm. high, with a few rather coarse leaves (0.5-0.7 mm. broad). Among the hundreds of sheets of this group examined I have seen none to match the two sheets at hand of the original collection of var. *occidentalis*, consequently it seems better to treat this plant (subsequently renamed *P. interior* Rydb.) as a somewhat exceptional deep-water state of the species.

*P. FILIFORMIS* Pers., var. **borealis** (Raf.) n. comb. *P. borealis* Raf., Med. Repos. ii. 354 (1808). Resembling *P. filiformis* but differing in the strongly marked tendency to have the spike short, with the whorls approximate: leaves finely setaceous, 0.25-0.5 mm. broad; mature spike 0.5-2.5 cm. long, the upper verticels mostly approximate, the lower approximate or at most 7 mm. apart.—Chiefly in calcareous waters, Newfoundland to northern Maine, New York and Pennsylvania, west to Alaska and south to Colorado; also in India, Tibet and China.

NEWFOUNDLAND: border of Castle Pond, Tilt Cove, northern shores of Notre Dame Bay, Aug. 21, 1911, *M. L. Fernald, K. M. Wiegand & H. T. Darlington*, no. 4,493 (H); shallow pools, wet runs and boggy spots in limestone barrens, near sea-level, Ingornachoix Bay, Aug. 4, 1910, *M. L. Fernald, K. M. Wiegand & J. Kittredge Jr.*, no. 2,460 (H); pools on serpentine tableland, 550 m. altitude, northeast-

<sup>1</sup> Internat. Rules Bot. Nomen., Vienna, Art. 51, 4 (1905).

<sup>2</sup> Schumacher, Enum. Pl. Saellandiae i. 51 (1801).

ern region of the Blomidon ("Blow-me-down") Mountains, region of Bay of Islands, Aug. 21, 1910, *M. L. Fernald & K. M. Wiegand*, no. 2,459 (H); shallow pools near Harry's River, Silurian region between Bay St. George and Bay of Islands, Aug. 18, 1910, *M. L. Fernald & K. M. Wiegand*, no. 2,458 (H); shallow stream, wet runs and boggy spots in limestone barrens, upper slopes and tablelands, 200–300 m. altitude, Table Mountain, region of Port au Port Bay, Aug. 16, 1910, *M. L. Fernald, K. M. Wiegand & J. Kittredge Jr.*, no. 2,457 (H). QUEBEC: Shallow water, Lake Mistassini, Aug. 10, 1885, *J. M. Macoun* (C no. 3,012); shallow pond, Longue Pointe, Brest, Saguenay County, July 31, 1915, *H. St. John* (C); in 5 feet of water, small pond, Ile à Chasse, Mingan Islands, Sept. 10, 1915, *H. St. John* (C); brackish ponds, Salt Lake, Anticosti, Aug. 10, 1883, *J. Macoun* (C no. 3,015); in water, Madeline River, Gaspé County, Aug. 5, 1882, *J. Macoun* (C no. 3,014); shallow pool, margin of River Ste. Anne des Monts, Aug. 17, 1906, *M. L. Fernald & J. F. Collins*, no. 160 (C & H); marl, Trout Pond, mouth of the Grand River, Aug. 11–15, 1904, *J. F. Collins, M. L. Fernald & A. S. Pease* (C & H); dead waters between the Forks and Brûlé Brook, Little Cascapedia River, Bonaventure County, July 29 & 30, 1904, *J. F. Collins, M. L. Fernald & A. S. Pease* (H). MAGDALEN ISLANDS: edge of pond in sand dunes, Brion Island, Aug. 6, 1914, *H. St. John* (H). PRINCE EDWARD ISLAND: shallow pools among the sand hills, Brackley Point, Aug. 3, 1914, *M. L. Fernald & H. St. John*, no. 10,895 (H). MAINE: about cold springs in marl, margin of Nadeau Lake, Fort Fairfield, Aug. 18, 1901, *M. L. Fernald* (H & N & R). NEW YORK: on sandy bottom, 1.5 feet deep, Seneca Lake, Geneva, Aug. 14, 1884, *T. Morong* (H); western part, *A. Gray* (H); in the rapids above Niagara Falls, Aug. 20, 1875, *T. Morong* (H). PENNSYLVANIA: in Cedar Creek at the Duck Farm Hotel, at the foot of Walnut Street, Allentown, July 27, 1912, *H. W. Pretz*, no. 4,851 (A); Allentown, com. Oct. 7, 1878, *Eugene A. Rau* (A); Cedar Creek, Lehigh County, 1878, *A. F. K. Krout*, Series A no. 2,724 (A); swift stream, submerged, Cedar Creek, near Griesemer's Hotel, July 16, 1912, *Daniel W. Hamm*, no. 1,139 (A); Presque Isle, Erie, Sept. 11, 1869, *Garber* (A). KEEWATIN: in pools or tundra, Ranken Inlet, Hudson Bay, latitude 62° 45', Aug. 30, 1910, *J. M. Macoun* (C no. 79,200). ONTARIO: shallow ponds, "The Twins," James Bay, July 7, 1887, *J. M. Macoun* (C no. 4,148); above Niagara Falls, July 12, 1901, *J. Macoun* (C no. 26,838); Lake Scugog, *W. Scott*, Aug. 12, 1891, (C no. 16,465). MICHIGAN: Crystal Lake, Frankfort, Aug. 13, 1880, *E. J. Hill* (H); Charlevoix, Aug. 26, 1894, *C. F. Wheeler* (H); Rapids of St. Mary's River, Sault Ste. Marie, Aug. 25, 1882, *T. Morong* (H & Y). SASKATCHEWAN: plains, Aug. 16, 1872, *J. Macoun* (C no. 62,583); west of Yorkton, July 7, 1906, *J. Macoun & W. Herriot* (C no. 76,877); in shallow water, Crane Lake, June 22, 1894, *J. Macoun* (C no. 4,375). ATHABASCA: Peace River Landing, June 30, 1903, *J. M. Macoun* (C no.

61,283). ALBERTA: west of Banff, July 6, 1891, *J. Macoun* (C no. 4,384); near Banff, July 15, 1891, *J. Macoun* (C no. 4,376); Bow River Valley, 4,500 feet altitude, July 28, 1906, *Stewardson Brown*, no. 680 (A). MONTANA: Corvallis, Bitterroot Valley, July 29, 1880 *S. Watson*, no. 393 (H); near Frenchtown, Bitterroot Valley, Aug. 4, 1880, *S. Watson* (H). WYOMING: Lower Basin, Yellowstone Park, 7,300 feet altitude, July 15, 1906, *W. S. Cooper*, no. 74y (R); brackish ponds, Yellowstone Park, Aug. 1884, *Frank Tweedy* (Y); Upper Geyser Basin, Sept. 1, 1878, *C. Richardson* (H); Big Horn Mountains, July-Aug., 1897, *T. A. Williams* (R). COLORADO: Twin Lakes, Sept., *Wolf & Rothrock* (H); Gunnison, 7,680 feet altitude, Aug. 16, 1901, *C. F. Baker*, no. 828 (H & R); Buena Vista, *J. H. Ferriss* (H). UTAH: Bear River, 8,000 feet altitude, Aug., 1869, *S. Watson*, no. 1,144 (H & Y). ROCKY MOUNTAINS: *Drummond*, no. 134 (H). BRITISH COLUMBIA: fresh water lakes, near Kicking Horse Lake, 5,500 feet altitude, Aug. 15, 1890, *J. Macoun* (C no. 3,010). YUKON: mud in Klondike River, near Dawson, July 15, 1902, *J. Macoun* (C no. 79,029); in water, Lewis River, Dawson, latitude 62°, Sept. 6, 1887 (C no. 4,146). ALASKA: water, Atkah Island, Aleutian Islands, Aug. 26, 1891, *J. M. Macoun* (C no. 28,159). INDIA: Garhwál, elevation 15,000 feet, *R. Strachey & J. E. Winterbottom* (H). TIBET: left shore of the Indus near Leh, Province of Ladák, July 5-10, 1856, *Schlagintweit*, no. 923 (H). CHINA: 1873, *Korolkoff & Krause* (H).

Rafinesque's name *P. borealis* is based on the description in Michaux's *Flora Boreali-Americana*, i. 102 (1803) of *P. marinum?* L., for plants found in subsaline rivers flowing into the St. Lawrence. Michaux's use of the phrase "spica —, quasi verticillatim interrupta" indicates that he was describing the plant with a short spike of nearly approximate whorls. Thus we can use Rafinesque's name to designate this commonest American variety of *P. filiformis*. It is worthy of note that in the paper referred to, Rafinesque indicates as new species, four Potamogetons "that have been considered congenial to some European species; but which upon investigation, have appeared to me different." Three of these, *P. epiphydrus*, *diversifolius*, and *foliosus* have already been taken up and now we can recognize as of varietal rank the fourth, his *P. borealis*.

The var. *borealis*, like typical *P. filiformis*, is found with the spike exceeding or exceeded by the leaves and the stem short, bushily branched, or in deep water less branched and the stem elongate.

*P. FILIFORMIS* Pers., var. *MACOUNII* Morong, Mem. Torr. Bot. Club, iii. no. 2, 50 (1893). *P. marinum* L., var. *Macounii* Morong in Macoun, Cat. Can. Pl. iv. 88 (1888).— Resembling var. *borealis* in its short spike of mostly approximate whorls, but differing in having broad



coarse leaves 0.75–2 mm. broad and sometimes apiculate at tip.—Still or flowing waters, Magdalen Islands, Quebec and Prince Edward Island and from northern Ontario to Saskatchewan, South Dakota and California.

MAGDALEN ISLANDS: brook in a springy marsh, Grindstone, Grindstone Island, July 17, 1912, *M. L. Fernald, E. B. Bartram, B. Long & H. St. John*, no. 6,792 (H); shallow pools and slow brooks in a larch swamp, Grindstone, Grindstone Island, Aug. 13 & 14, 1912, *M. L. Fernald, B. Long & H. St. John*, nos. 6,785 and 6,786 (H). PRINCE EDWARD ISLAND: water, North Pond, near East Point, Aug. 15, 1888, *J. Macoun* (C no. 4,373a); North Pond, Aug. 15, 1888, *J. Macoun* (C no. 4,373). ONTARIO: The Beacon, Mouth of the Moose River, James Bay, July 19, 1904, *W. Spreadborough* (C no. 62,664). MANITOBA: four miles east of Forest, June 19, 1906, *J. Macoun & W. Herriot* (C no. 76,875); six miles east of Forest, June 19, 1906, *J. Macoun & W. Herriot* (C no. 76,876). SOUTH DAKOTA: Rapid Creek below Pactola, 4,400 feet altitude, Black Hills National Forest, July 14, 1910, *J. Murdoch Jr.*, no. 4,250 (H); Black Hills, 1887, *Dr. W. H. Forwood* (H). SASKATCHEWAN: in salt marshes, Old Wives Lake, July 23, 1880, *J. Macoun* (C no. 3,008); west of Yorkton, July 7, 1906, *J. Macoun & W. Herriot* (C no. 76,878); Moose Mountain Creek, July 1, 1883, *J. M. Macoun* (C no. 3,016). ALBERTA: still or slow flowing water, south of the Hand Hills, Aug. 22, 1879, *J. Macoun* (C no. 3,009); Vermilion Lakes, Banff, Aug. 13, 1891, *J. Macoun* (C no. 4,374a); Vermilion Lakes, Banff, July 15, 1891, *J. Macoun* (C no. 4,376). MONTANA: ditches, Belgrade, Bozeman, Aug. 19, 1905, *J. W. Blankinship*, no. 572 (A). IDAHO: in a slough, Henry's Lake, Fremont County, Sept. 1, 1899, *A. Nelson & E. Nelson*, no. 6,808 (H). WYOMING: flowing water, Norwood Creek, Big Horn County, Aug. 9, 1901, *L. N. Gooding*, no. 508 (H); Granger Ham's Fork, July 30, 1897, *A. Nelson* 4,142 (H & R); Evanston, July 10, 1897, *T. A. Williams* (H & R); shallow ponds, Jackamore Creek, 50 miles north of Point of Rocks, *E. D. Merrill & E. N. Wilcox*, no. 608 (H & R); in a woodland pool, Snake River, Aug. 12, 1899, *A. Nelson & E. Nelson*, no. 6,483 (R); in a slough, Henry's Lake, Fremont County, Sept. 1, 1899, *A. Nelson & E. Nelson*, no. 6,808 (R); in streams, Dayton, 4,000 feet altitude, Sheridan County, Sept., 1899, *Frank Tweedy*, no. 2,259 (Y); Fort Bridger, Aug. 6, 1873, *T. C. Porter* (A); Sour Creek, 8,200 feet altitude, Yellowstone Park, Sept., 1885, *Frank Tweedy* (Y); Shoshone Creek, Geysers Basin, Yellowstone Park, Aug. 22, 1878, *C. Richardson* (H); in a woodland pool Snake River, Yellowstone Park, Aug. 12, 1899, *A. Nelson & E. Nelson*, no. 6,483 (H). COLORADO: in Tomichi River, Parlin, 8,000 feet, Gunnison County, Aug. 20, 1901, *B. H. Smith* (A). UTAH: Fish Lake, 9,000 feet altitude, Aug. 9, 1894, *M. E. Jones*, no. 5,782 (R). NEVADA: Ruby Lake, 6,000 feet altitude, 1868, *S. Watson*, no. 1,140 (Y). CALIFORNIA: Leavitt's Meadows, Bridgeport and Sonora Road, Mono County, Aug. 22, 1898, *J. W. Congdon*, no. 99.14 (H).

Morong in his monograph limits this variety to the plants of the shallow pools which have "a compact, bushy habit, leaves 1-3 inches long." This passes without perceptible demarcation to the equally coarse plant with longer leaves and an elongate stem. It seems better and more consistent to include these under the var. *Macounii*. A plant cited<sup>1</sup> as *P. juncifolius* Kern. from North Pond, Prince Edward Island, seems to belong here.

Another American specimen named *P. juncifolius* Kern. from Labrador, in the Ungava River, Fort Chimo, Aug. 23, 1896, *Spreadborough*, (C no. 16,471) may be correctly identified, but it is so young that it is difficult to name with any certainty.

HARVARD UNIVERSITY.

## LAPPULA DEFLEXA IN VERMONT.

J. R. CHURCHILL.

As a result of my discovery in July, 1914, of a considerable colony of the "Nodding Stickseed," *Lappula deflexa* (Wahlenb.) Garcke, in Derby, Orleans County, Northern Vermont, I have been interested to investigate the history and the range of this attractive though somewhat weedy stranger. The plants were growing along one side of the main road leading south from Derby Line, in open country, about a mile from the village. The highway appeared to have been recently, extensively repaired or reconstructed, thus confirming the impression that the plants had been introduced.

Like all the Stickseeds *L. deflexa* is admirably adapted by its prickly-barbed nutlets to easy and wide distribution by railroads and other carriers. And yet my brief study of this species and its history indicates that, despite these devices for migration, the plant has failed hitherto to extend materially its long recorded range. *Lappula deflexa* (*Echinosperrum deflexum*, Lehm.) is found in Siberia and continental Europe and has long been known in the extreme northwestern United States and the adjacent Canadian provinces. And recent collections by Prof. Fernald and others show that the species is indigenous in

<sup>1</sup> Bennett in Journ. Bot. xlvii 162 (1908).